



for a perfect fit

CAD/CAM bar restoration for the mandible
on Xive implants

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INTRODUCTION

Conventional or CAD/CAM? Today dental technicians and implantologists ponder this question more frequently than ever. More and more often, they tend towards CAD/CAM. CAD/CAM fabricated solutions are particularly well suited for the restoration of larger jaw sections due to their tension-free fit. Deciding in favor of or against a CAD/CAM restoration should thus always be a team decision together with the dental technician since with his expertise and training, he is able to contribute considerably to an esthetic and technically perfect result. To ensure successful prosthetic restorations, all the steps of a procedure – from planning through impression to insertion – need to be performed with utmost care. This is equally true for both conventionally cast work and CAD/CAM fabricated structures. With both methods, only a precise transfer of the oral situation to the model guarantees success. Precision is vital in both methods – particularly, when restoring larger jaw sections. One can obtain outstanding results even with conventional casting technology if working accurately and with sufficient experience. Yet the risk of an ill fit is substantially higher compared to modern CAD/CAM procedures. Furthermore,

wide-spanning and solid framework in particular enables cavities to arise and the framework to warp. Also (partial) overheating of the melt, another potential quality flaw, is often observed with large volumes. One does not encounter these problems using CAD/CAM technology.

THERAPY DECISION

Our patient wanted to regain a firm bite and unimpaired speech. She had already been wearing mucosa-supported complete dentures for 20 years, but was comfortable only with the maxillary denture. The grip of the mandibular prosthesis was inadequate due to the resorbed alveolar ridge (Fig. 1) and obstructed the patient while eating and speaking. There were no general medical findings ruling out an implantation. After detailed consultation, we opted for a bar denture on four implants placed interforaminally in the mandible. A fixed restoration was not possible due to cost considerations. A prosthesis on two implants, which would be more economical, was not alternative from a medical perspective. The patient desired as stable a restoration as possible and we had to avoid degradation of the implant site through tilting motions in each case. In the current case the precision, which can only be achieved with this procedure, turned the balance in favor of a CAD/CAM produced bar construction. This is also the reason why our dental laboratory, whenever possible, uses wide-span superstructures that are fabricated industrially. The result becomes ultra-predictable in conjunction with the two-stage impression process that we have been implementing with conventionally cast framework for years. We frequently use the two-stage method whenever there are high demands on the accuracy of the impression.



TRANSFER OF IMPLANT POSITIONS

Four months after insertion, the osseointegrated implants (Xive S, length 13 mm; diameter: distal 4.5 mm, mesial 3.8 mm) were restored with gingiva formers. The situation was impressed and an individual tray created. The impression at implant level was made two weeks after uncovering (Fig. 2). The Friadent pick-up transfer copings were then screwed onto the analogs in the dental laboratory. Precisely transferring the oral situation with the abutments onto the model requires a second impression with an appropriate control key. A bar made from autopolymerizate is used for this. To reconcile any tensions which develop during polymerization, the bar is divided into four parts (Fig. 3). We went on to make a second individual tray (Fig. 4) and a plastic-based template to determine the relation. We designed the template in such a way that it can be secured with two impression copings onto the Friadent MP abutment fixed in the mouth (Fig. 5). This is the only way to reliably test the bite as well as esthetics, function and phonetics during the later wax-up.

During the session to determine the relation, an impression was also made at gingiva level using the plastic bar. The individual parts were screwed on the Friadent MP abutments (Fig. 6) and splinted together using as little autopolymerizate as possible (Fig. 7). The final abutments always remain in the mouth from this point in time onwards. This has the benefit that peri-implant bone resorption is limited and the soft tissues can heal undisturbed. The impression was made with a two-phase silicon (Aquasil Ultra, DENTSPLY DeTrey, Fig. 8). The

master cast was made of class IV dental stone. Making a gingival mask is part of the standard procedure (Fig. 9). Fabricating two precision impressions allows maximum accuracy to be achieved with wide-span superstructures. If any inaccuracies are perceived during the impression and model manufacturing process, the corresponding step has to be repeated in each case.

MANUFACTURE AND TRY-IN OF THE BAR

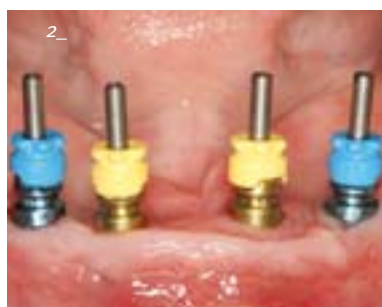
In order to fabricate the Xive CAD/CAM bar, only the result of the wax try-in was still necessary. This was performed in a separate session using a plastic-based template (Figs. 10 to 11). The wax try-in is fixed onto two implants to facilitate better and definite positioning (Fig. 12). Together with the master cast, the set-up was then sent to the DENTSPLY CAD/CAM center, where both were scanned in with a customized system. The data records resulting from the scan served as a basis for constructing the bar. At the latest, the construction proposal leaves the DENTSPLY CAD/CAM center one day after receiving the model by email. The construction is checked with the viewer software provided by DENTSPLY Friadent at no cost (Fig. 13). The jaws, bar and set-up can easily be shown, hidden and viewed from all angles with the software providing optimal control. At this point, the DENTSPLY CAD/CAM center still accepts corrections. After the design has been approved, the data record is emailed back to the DENTSPLY CAD/CAM center. The CAD/CAM structure is delivered within seven days after the approval has arrived. In our experience, any conceivable bar solution in any size and

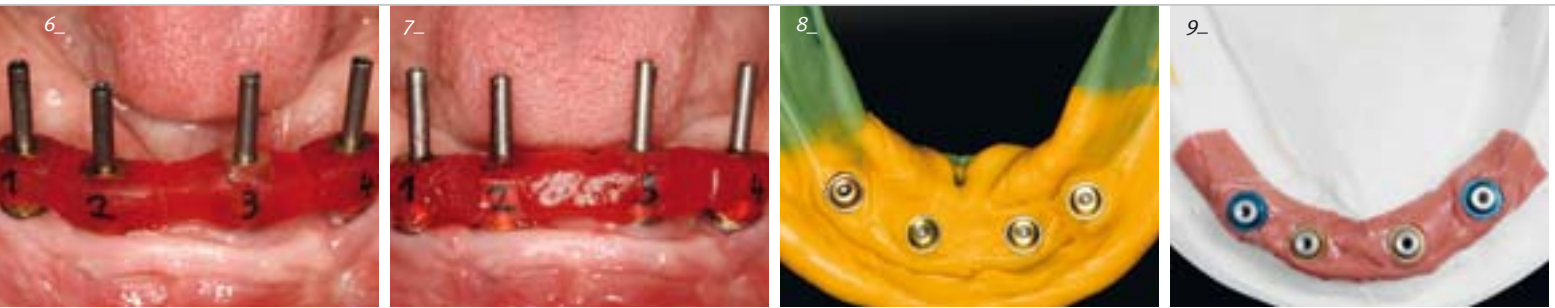
1_ The panorama image shows the situation prior to insertion of the Xive S implants.

2_ Two weeks after uncovering, an open pick-up impression is made at implant level with an individual tray.

3_ To check the accuracy of transfer, a bar made from autopolymerizate is manufactured on a screwed-in Friadent MP abutments and split into segments.

4_ The individual tray for the pick-up impression with fixed pick-up screws
5_ The bite template is fixed in the mouth on two implants.





type can be realized with the DENTSPLY Friadent range, for example Dolder bars, round bars or even bars with different retaining elements. At delivery, the bar already exhibited a quality of finish equal to a highly polished state (Fig. 14). We first checked the accurate fit on the master cast, before we sent the bar for a try-in at the dental practice. In order to detect any gap formations on the opposite side, the bar was first screwed in (Sheffield test) on one side. The fit also proved to be very accurate, even intraorally (Fig. 15). X-ray control of the completely screw-retained bar provides additional security (Fig. 16).

COMPLETION

After the bar was slightly revised and given a final polish, the Galvano intermediate layer could be made (Fig. 17). After making the model casting scaffold for the denture, the bolts were fitted (Fig. 18). Before completing the bar denture, a second wax try-in was carried out for functional fine adjustment. To ensure optimal stability, we always make the basal portions of dentures from cold polymerizate. During the finishing process, the soft tissues were replaced with

individually fashioned plastic. As patients recognize the clear esthetic difference to their “old” dentures, individual creation increases their satisfaction quite considerably. This also helps them to better accept the, as yet, relatively high costs of implant restoration. Fig. 19 shows a basal view of the finished denture, Fig. 20, the inserted work.

PROCESS CONTROL

The introduction of CAD/CAM fabricated structures (bars, bridge framework) does not change the cooperation between dentists or oral surgeons and dental technicians. However, producing the superstructure industrially necessitates rethinking the dental laboratory in one respect. Framework is no longer waxed up, but conceived on screen or, as in our case, processed on the dental laboratory PC according to a proposal from the CAD/CAM center and, if required, modified to fit individual wishes. External production requires appropriate scheduling. Steps determining esthetics and function, such as approving framework design and producing the superstructure, remain in the dental laboratory as it used to be with the conventional procedure. As before, the treatment team controls the entire process. The DENTSPLY

6_ Preparation for pick-up impression: The four separate parts of the bar are screwed-in in the mouth.

7_ The segments are splinted with a small amount of autopolymerizate. The Friadent MP abutments are not removed afterwards.

8_ Double-mix impression

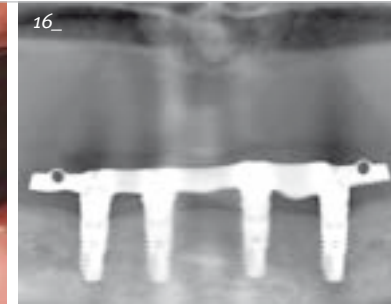
9_ The master cast with removable gingiva mask

10_ The wax-up

11_ The basis of the wax-up with the sunken impression copings

12_ Screw-retaining the wax-up with the two distal implants ensures correct position when fitting.





13_ The construction proposal supplied by DENTSPLY CAD/CAM center
 14_ The bar milled according to the dental laboratory's specifications fits perfectly on the laboratory analog. The bolt eyes for the planned MK1-locking bolts are clearly recognizable in the distal extensions.
 15_ The bar fits accurately onto the implants and has tissue-friendly adaptation to the alveolar ridge.

16_ The x-ray control after screwing the bar in
 17_ The Galvano intermediate layer
 18_ The scaffold with the MK1 locking bars
 19_ The finished bar denture from basal direction
 20_ The finished dentures

CAD/CAM center is merely an external supplier and has no influence on the therapy. The manufacturer's warranty on CAD/CAM structures is also of interest since it lasts up to ten years. This is possible because industrial standardization ensures the high quality of the blanks' material and industrial milling guarantees maximum precision. The risk of material failure or faulty manufacturing – and hence economically difficult re-manufacture – is minimized.

CONCLUSION

The patient was enthusiastic about her new denture. Her wishes for improved function and phonetics were fully met. The procedure described here, developed in "conventional times" according to our experience, has a permanent place in our team. Furthermore, with DENTSPLY CAD/CAM solutions we have a reliable system at our disposal. It substantially simplifies work procedures, increases precision and ensures full control over all working steps. ■

Literature on request from the authors



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